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WEINGARTEN, SCHURGIN, GAGNEBIN & LEBOVICI LLP
TEN POST OFFICE SQUARE
BOSTON, MA 02109

EXAMINER
IGYARTO, CAROLYN

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)
	10/580,161	LI ET AL.
	Examiner	Art Unit
	Carolyn Iggyarto	2884

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on 19 May 2006.
 2a) This action is FINAL. 2b) This action is non-final.
 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 1-19 is/are pending in the application.
 4a) Of the above claim(s) 16 and 17 is/are withdrawn from consideration.
 5) Claim(s) _____ is/are allowed.
 6) Claim(s) 1-9, 11-15 and 19 is/are rejected.
 7) Claim(s) 10 and 18 is/are objected to.
 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
 10) The drawing(s) filed on 19 May 2006 is/are: a) accepted or b) objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) All b) Some * c) None of:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>19 May 2006</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

1. Restriction is required under 35 U.S.C. 121 and 372.

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1.

In accordance with 37 CFR 1.499, applicant is required, in reply to this action, to elect a single invention to which the claims must be restricted.

Group I, claim(s) 1-15 and 18-19, drawn to a microbolometer sensor.

Group II, claim(s) 16-17, drawn to a process of forming a micromechanical cantilever structure.

2. The inventions listed as Groups I and II do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: Group II lacks at least the special technical feature of a second cantilever, which deflects oppositely to said first cantilever in response to radiation.

3. During a telephone conversation with Charles L. Gagnebin III (Re. No. 25,467) on 19 December 2007 a provisional election was made with traverse to prosecute the invention of a microbolometer sensor, claims 1-15 and 18-19. Affirmation of this election must be made by applicant in replying to this Office action. Claims 16-17 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

4. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one

or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Priority

5. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Information Disclosure Statement

6. The information disclosure statement submitted on 19 May 2006 has been considered by the Examiner and made of record in the application file.

With Respect to the International Search Report

7. References listed on the international search report have been considered.

Oath/Declaration

8. The oath or declaration is defective. A new oath or declaration in compliance with 37 CFR 1.67(a) identifying this application by application number and filing date is required. See MPEP §§ 602.01 and 602.02.

The oath or declaration is defective because:
The date provided by inventor Thomas Bifano is not a full date.

Drawings

9. New corrected drawings in compliance with 37 CFR 1.121(d) are required in this application because of the following reasons: Some of the drawings are of too poor quality to identify where some reference characters are pointing; Some of the figures are too dark to identify the features presented in the figures; The handwriting should be replaced with typed text. Applicant is advised to employ the services of a competent patent draftsperson outside the Office, as the U.S. Patent and Trademark Office no longer prepares new drawings. The corrected drawings are required in reply to the Office action to avoid abandonment of the application. The requirement for corrected drawings will not be held in abeyance.

Specification

10. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

11. The disclosure is objected to because of the following informalities: The Description of the Drawings lists Fig. 10, however, Figs. 10A and 10B are provided in the drawings.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

12. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

13. Claims 1-4, 7-9, 11-15, and 19 are rejected under 35 U.S.C. 102(e) as being anticipated by Fedder et al. (US 6,737,648), hereinafter referred to as Fedder.

14. With respect to **claim 1**, Fedder teaches a microbolometer sensor (Abstract) comprising:

a first cantilever supported above a substrate and formed of a bimaterial so as to deform in a first direction in response to incident radiation (col. 3, lines 43-48; col. 5, lines 37-40; Fig. 1);

a second cantilever supported above said substrate and formed of a bimaterial so oriented as to cause said second cantilever to deflect oppositely to said first cantilever in response to radiation (col. 3, lines 48-54; col. 5, lines 41-44; Fig. 1);

said first and second cantilevers having a spacing therebetween which varies as a function of radiation incident on said first and second cantilevers (col. 5, lines 37-44); and

means for sensing the deflection of said first and second cantilevers to provide an indication of the incident radiation (col. 5, lines 43-44).

15. With respect to **claim 2**, Fedder teaches said first and second cantilevers include multiple vanes (78) supported so as to at least partially overlap (Fig. 13).
16. With respect to **claim 3**, Fedder teaches said first and second cantilevers extend above said support substantially parallel to each other (Fig. 1).
17. With respect to **claim 4**, Fedder teaches said cantilevers are coated to absorb said radiation (Fig. 10; col. 8, line 67 – col. 9, line 1).
18. With respect to **claim 7**, Fedder teaches a plurality of said cantilevers in any array (Fig. 15).
19. With respect to **claim 8**, Fedder teaches said means for sensing deflection includes means for sensing a capacitance between said cantilevers (col. 5, lines 41-44).
20. With respect to **claim 9**, Fedder teaches a coating on at least one of said cantilevers to provide thermal isolation therebetween (col. 6, lines 21-22).

21. With respect to **claim 11**, Fedder teaches said radiation is IR radiation (Abstract; col. 5, lines 37-40).

22. With respect to **claim 12**, Fedder teaches forming the sensor using micromechanical procedures (col. 6, lines 7-8).

23. With respect to **claim 13**, Fedder teaches the steps of forming one or both of said cantilevers on a sacrificial layer and subsequently etching away said sacrificial layer (Figs. 7-8; col. 7, lines 23 and 45-47).

24. With respect to **claim 14**, Fedder teaches the step of forming said cantilevers from supports having footings buried in said substrate and wherein said substrate is silicon (col. 7, lines 23-67; the cantilevers are formed from etching away the substrate; inherently, the cantilevers would include supports having footing buried in substrate).

25. With respect to **claim 15**, Fedder teaches the step of forming at least a portion of said sensing means on said substrate (44; Fig. 9).

26. With respect to **claim 19**, Fedder teaches the step of forming said cantilevers from supports having footings buried in said substrate and wherein said substrate is silicon (col. 7, lines 23-67; the cantilevers are formed from etching away the substrate; inherently, the cantilevers would include supports having footing buried in substrate);

further including the step of forming at least a portion of said sensing means on said substrate (44; Fig. 9).

Claim Rejections - 35 USC § 103

27. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

28. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

29. **Claim 5** is rejected under 35 U.S.C. 103(a) as being unpatentable over Fedder as applied to claim 1 above, and further in view of Sauer et al. (US 2002/0033453), hereinafter referred to as Sauer.

Fedder teaches all of the limitations of claim 1, as explained above. Fedder further teaches the cantilevers to be made of silicon dioxide and aluminum layers (col.

6, lines 7-8), but does not teach using Al with SiN_x. Sauer teaches using a layer of Silicon Nitride with a layer of Aluminum forming a bi-material ([0040] lines 8-11). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to try replacing the Silicon Dioxide, as taught by Fedder, with the Silicon Nitride, taught by Sauer to form a bimaterial that will bend in response to radiation, as a person with ordinary skill has good reason to pursue known options within his/her technical grasp.

30. **Claim 6** rejected under 35 U.S.C. 103(a) as being unpatentable over Fedder.

Fedder teaches all of the limitations of claim 1, as explained above. Fedder does not explicitly teach said cantilevers and said substrate define a quarter wave cavity. However, it is known in the infrared sensor art to use a quarter wave cavity for the benefit of increasing sensitivity by decreasing interference. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have said cantilevers and said substrate define a quarter wave cavity for the benefit of increasing sensitivity by decreasing interference.

Allowable Subject Matter

31. **Claims 10 and 18** are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

32. The following is a statement of reasons for the indication of allowable subject matter: Fedder teaches all of the limitations of claims 1-2 and 9, as explained above. Ray, Michael (US 2002/0179837) teaches using NiCr for thermal isolation ([0022] lines 13-14).

The prior art of record does not disclose or reasonably suggest, along with the other claimed limitations, a sensor comprising: namely, a thermal isolation coating made of NiCr on a side of at least one cantilever facing the other Said cantilever.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Carolyn Igyarto whose telephone number is (571) 270-1286. The examiner can normally be reached on Monday - Thursday, 7:30 A.M. to 5 P.M. E.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dave Porta can be reached on (571) 272-2444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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JULIA CLOUGH 07/03/2018